

WHAT IS CLAIMED IS:

- 1           1.       A converter circuit, comprising:  
2           an AC-to-DC converter, comprising a plurality of first power devices;  
3           a resonant DC link, comprising at least one auxiliary power device;  
4           a DC-to-AC converter, comprising a plurality of second power devices; and  
5           DC link lines, coupling the AC-to-DC converter, the resonant link, and the DC-  
6 to-AC converter, wherein  
7           the auxiliary power device is coupled between the DC link lines.
- 1           2.       The converter of Claim 1, wherein the plurality of first power devices  
2 comprise:  
3           first power devices selected from the group of MOS-FETs and npn bipolar  
4 transistors.
- 1           3.       The converter of Claim 2, wherein the plurality of first power devices  
2 comprise:  
3           first power diodes, coupled across corresponding first power transistors.
- 1           4.       The converter of Claim 3, wherein the first power diodes being coupled  
2 across the first power transistors comprises a first power diode being coupled between a  
3 source and a drain of a MOS-FET first power transistor.
- 1           5.       The converter of Claim 3, wherein the first power devices are coupled  
2 pair-wise in series to form a plurality of first arms.
- 1           6.       The converter of Claim 5, wherein the AC-to-DC converter comprises at  
2 least one of three first arms and simple rectifiers, generating an essentially DC voltage.
- 1           7.       The converter of Claim 5, further comprising:  
2           first terminals coupled to corresponding first arms, the first terminals operable to  
3 receive AC power from an AC power source.

1           8.       The converter of Claim 1, wherein the plurality of second power devices  
2 comprise:  
3           second power transistors selected from the group of MOS-FETs and npn bipolar  
4 transistors.

1           9.       The converter of Claim 8, wherein the plurality of second power devices  
2 comprise:  
3           second power diodes, coupled across corresponding second power transistors.

1           10.      The converter of Claim 9, wherein the second power diodes being  
2 coupled across the second power transistors comprises a second power diode being  
3 coupled between a source and a drain of a second MOS-FET power transistor.

1           11.      The converter of Claim 9, wherein the second power transistors are  
2 coupled pair-wise in series to form a plurality of second arms.

1           12.      The converter of Claim 11, wherein the DC-to-AC converter comprises  
2 three second arms.

1           13.      The converter of Claim 11, further comprising:  
2           second terminals coupled to corresponding second arms, the second terminals  
3 operable to provide AC power to a load.

1           14.      The converter of Claim 1, wherein the DC-to-AC converter comprises:  
2 a resonant capacitor;  
3 an equivalent power diode; and  
4 an equivalent switch; wherein  
5           the resonant capacitor, the equivalent power diode, and the equivalent  
6 switch are coupled:  
7           between the DC link lines; and  
8           parallel with each other.

1           15.     The converter of Claim 1, wherein the auxiliary power device of the  
2 resonant DC link comprises:  
3           an auxiliary power transistor, selected from the group of MOS-FETs and npn  
4 bipolar transistors.

1           16.     The converter of Claim 15, wherein the auxiliary power device of the  
2 resonant DC link comprises:  
3           an auxiliary power diode, coupled across the auxiliary power transistor.

1           17.     The converter of Claim 1, wherein:  
2           the auxiliary power device is not coupled into the DC link lines.

1           18.     The converter of Claim 16, wherein the resonant DC link comprises:  
2           a first capacitor, coupled in series with the auxiliary power device;  
3           a resonant capacitor, comprising parasitic capacitors of the power devices;  
4           an inductance, coupled in parallel with the auxiliary power device and the first  
5 capacitor, the inductance forming a resonant circuit with the resonant capacitor; and  
6           a second capacitor, coupled in series with the switching LC resonator.

1           19.     The converter of Claim 18, outputting an output voltage between the DC  
2 link lines, wherein the output voltage is essentially clamped to the sum of the voltage  
3 across the first capacitor and the voltage across the second capacitor.

1           20.     A method of operating a converter circuit, the converter circuit  
2 comprising an AC-to-DC converter, a resonant DC link, comprising at least one  
3 auxiliary power device, a DC-to-AC converter, and DC link lines, coupling the AC-to-  
4 DC converter, the resonant link, and the DC-to-AC converter, wherein the auxiliary  
5 power device is coupled between the DC link lines, the method comprising:  
6           switching the auxiliary power device with an essentially zero voltage switching  
7 condition.